Caffeine is a naturally occurring, flavorless chemical that acts as a stimulant to the central nervous system (Gilbert 18). It is known as a psychoactive drug because most people use it to stimulate their body and mind. Caffeine gives people a “boost of energy” in the morning or helps them stay awake at night. The most common sources of caffeine come from coffee, chocolate, cola, and tea. In fact, approximately 90% of the population consumes caffeine everyday and the average person consumes 200-300 milligrams of caffeine each day (Lee 19). Teenagers in particular are consuming more and more caffeine in the forms of soda and even coffee to meet the stressful demands of high school. Nowadays, teenagers have more homework and extracurricular activities to deal with and they want that extra boost to function properly and effectively. Do students really need caffeine or is it all in the mind? How will they react when it is taken away from them? How will they feel when they are given larger doses? Hopefully with my research I will be able to answer these and many other questions.

# The Chemistry of Caffeine

Although caffeine can be artificially added to sodas and other beverages, it is naturally found in many plants including coffee beans and cocoa nuts. Pure caffeine is a white, bitter tasting powder that is soluble in water. Its technical name is 3,7-dihydro-1,3,7-trimethyl-iH-purine-2,6-dione (Caffeine). This name suggests that caffeine is a purine compound. Purine does not occur in the body in its pure form, but when broken down, xanthine is produced as an intermediate product. Xanthine is further converted to uric acid, which is believed to contribute to a human’s longer life span than any other mammals (Brain). Other important purine compounds include adenine and guanine. These two purines along with cytosine and thymine are the four bases that make up the genetic code for each human being. Caffeine is a very complex drug with an intricate makeup.

Caffeine in the Body

Caffeine is a stimulant that affects behavior in the human body. First, the human must absorb caffeine either through parenteral administration or enternal administration (Gilbert 57). Parenteral administration is the most direct way of absorption. This is done mostly through injections and gets the caffeine into the bloodstream immediately. Enternal administration is the most common form of absorption. It is basically consuming caffeine from food. Once in the body through absorption, caffeine is then distributed. Caffeine flows from the gastrointestinal tract (mouth, throat, stomach, and intestines) to the liver and then the heart (Gilbert 58). It is then circulated throughout the entire body. Caffeine is distributed to all of the body’s water, which is about sixty percent of the total body weight of a human (Gilbert 60). The extent of the effects from the caffeine always depends on the individual since the amount of caffeine given to a person directly relates to that person’s weight.

# The Effects of Caffeine

Caffeine has many effects on a person’s mood and behavior. Since caffeine stimulates the central nervous system, brain activity increases once it is in the body. Caffeine may also affect a person’s sleep patterns. It may keep them awake, increase alertness, and get rid of fatigue. Caffeine can increase the speed of rapid information processing by 10% (Stimulant Effects of Caffeine). On the other hand, though, caffeine can heighten anxiety and body tension. Some studies have even shown that caffeine shortens reaction time among some users (Caffeine: Is it Dangerous to Health?).

Caffeine can also affect a person’s body. Some experiments have shown that low concentrations of caffeine may produce small decreases in heart rate, whereas higher concentrations may make the heart beat abnormally fast (Burchfield). Caffeine is also a strong diuretic, which means it makes a person urinate more than usual because of the increase in the blood flow through the kidneys. Caffeine also has a small effect on respiration by increasing blood flow through the lungs. As a result of this effect, caffeine has proven effective in treating the breathing problems of some prematurely born infants. By making more fatty acids available to the muscles, caffeine can increase the performance of muscles, which delay depletion of glygocen reserves. Depletion of glycogen from the muscles is tied in with fatigue (Burchfield). This kind of effect benefits endurance events such as running and cycling.

Overall, caffeine has both positive and negative effects both on a person’s body and mind.

## Withdrawal

Even though caffeine is a very popular drug that almost everyone consumes each day, it is also highly addictive and when taken away, people can experience withdrawal. However, normal variations in daily caffeine consumption or gradual reduction in daily intake produce no symptoms or adverse effects. Sudden reduction in caffeine intake or going “cold turkey,” though, can lead to symptoms of withdrawal (Cook). The worst symptoms of caffeine withdrawal include headaches, lethargy, depression and poor concentration. These symptoms usually let up after two days, and the rest dissipate within a week (Caffeine Withdrawal). Some people, though, who suddenly abstain from caffeine suffer no effects whatsoever. Whatever the case may be, caffeine users should be aware of the consequences of their consumption and get treated for any symptoms that they may experience as a result of their use of caffeine.

Caffeine is fast becoming the world’s most popular drug. It produces both beneficial and harmful effects and can also lead to addiction and withdrawal. Caffeine is a difficult drug to study, though, because of its wide range of use and lack of concrete evidence. However, in recent years most Americans have become very interested with the study of caffeine. In my research, I hope to collect conclusive evidence that caffeine increases a person’s concentration and energy level by either giving caffeine to them or taking it away.